ISSUE 1: PRE-DISPATCH PRICE UNCERTAINTY ~~BANDWIDTHS~~

Date Raised

Noted in the May 2003 Pricing Team Report.

Description

For many market participants, accurately predicting pre-dispatch prices is a key component in both making business decisions and managing their participation in the market. In particular, importers and exporters who offer or bid into the Ontario market are scheduled in real-time according to the hour-ahead pre-dispatch price. As well, participants in HADL and TDRP monitor the 3-hour ahead pre-dispatch prices to help determine their price-responsive actions and settlements in the market. Such participants would benefit from an understanding of how sensitive the published pre-dispatch prices are to potential changes in demand. An indicator or measure of pre-dispatch price sensitivity may serve as a valuable tool.

~~The Pre-dispatch Price Bandwidth represents the change in pre-dispatch price to a change in pre-dispatch demand. It was expected to provide an indicator of the Real-time to pre-dispatch price volatility. The bandwidth indicates what the forecasted Pre-dispatch price would be if the market demand was a given percentage higher and lower than the actual forecast. When plotted alongside the Pre-dispatch price, the forecast bandwidth shows the sensitivity of price to small changes in demand and hence the likelihood that the pre-dispatch price was going to be a good reflection of the ultimate real-time price (i.e. whether it would be significantly affected by the various factors (e.g. demand, import failures, etc.) which cause the real-time price to differ from the pre-dispatch.~~

Background

Pre-dispatch provides advance information and projections necessary to plan the physical operation of the electricity system and to allow participants to plan their future actions in the market. The pre-dispatch sequence is run every hour to derive schedules and prices for future hour periods. Results cover a range from 36 to 12 hours in the future, depending on the time of day that the sequence is initiated. However, unrestricted revisions to bids and offers in each hour are allowed up to 2 hours prior to the dispatch hour. Such revisions can result in significant changes in the pre-dispatch schedules and prices.

A number of market participants rely on the pre-dispatch prices published by the IMO to determine their operations and settlements. For example, in an effort to encourage market participants to become more price-responsive, the Transitional Demand Response Program (TDRP) will provide compensation to participants

who choose to reduce their demand in real-time when the 3-hour ahead pre-dispatch price meets or exceeds $120.

Similarly, loads who participate in the Hour Ahead Dispatchable Load (HADL) program submit offers to the IMO indicating the amount of energy they will reduce in real-time if the 3-hour ahead pre-dispatch energy price exceeds a certain level. If the 3-hour ahead pre-dispatch price is higher than the load's offer price, the IMO will send dispatch instructions to the load to reduce its consumption. If the real-time price turns out to be lower than the offer price, the load will be compensated via the HADL Offer Guarantee.

For importers and exporters, their dispatch schedules in real-time are determined along with the hour-ahead pre-dispatch price. In addition, the price used to settle imports and exports in real-time is the sum of the real-time Ontario Market Clearing Price (MCP) and the Intertie Congestion Price (ICP) which is determined during the hour-ahead pre-dispatch sequence. Importers are also provided with a price guarantee through the IMO's Intertie Offer Guarantee (IOG) payments. The IOG ensures that, over the course of the hour, an importer will receive at least the average price of their offer, even if the real-time MCP is lower than the final (hour-ahead) pre-dispatch price. Thus, expectations of the pre-dispatch prices should be a critical component in finalizing their import offers.

The pre-dispatch prices calculated each hour are currently published on the IMO web site, and available for viewing on the Market Prices Graph (http://www.theimo.com/imoweb/marketdata/marketToday.asp). Given that a number of market participants monitor the pre-dispatch prices quite intently, many feel that it would be beneficial for the IMO to provide them with some way of gauging pre-dispatch price certainty. By understanding more about the volatility of the prices published in pre-dispatch, participants should be able to make better-informed decisions in their operations planning and participation in the market.

~~The pre-dispatch prices published by the IMO have proven to be an unreliable indicator of the real-time Hourly Ontario Energy Price (HOEP). For Market Participants, this disparity can be significant when the expected electricity prices for the next hour or hours form the basis for making business decisions. Many of the loads in the IMO-administered markets rely on the real-time price of electricity to help determine their scheduling of operations.~~

~~The difference between the Pre-dispatch price and the HOEP can be primarily attributed to two factors:~~

- ~~? Different assumptions or inputs are used in developing the Pre-dispatch schedule and price compared to the Real-time schedule and price.~~

~~? The sensitivity of the market to changes in Pre-dispatch and Real-time conditions, especially when there is little spare generation available, on-line and scheduled in the market.~~

~~In particular, the sensitivity of the price is due to the nature of the Ontario market offer curve and the fact that the market typically schedules just enough resources to meet the forecast demand. Hence, small changes between the Pre-dispatch and Real-time market or system conditions can result in a large difference between their respective prices. These changes are typically:~~

~~? failed intertie transactions;~~

~~? differences between forecast and actual electricity production of self-scheduling generation units;~~

~~? forced generation outages / de-ratings; and / or~~

- ~~the difference between the forecast and actual demand.~~

~~The Pre-dispatch prices calculated each hour are currently published on the IMO web site, and available for viewing on the Market Prices Graph (http://www.theimo.com/imoweb/marketdata/marketToday.asp).~~ In order to address the issue of price sensitivity, the IMO had suggested providing market participants with pre-dispatch price bands. This means that a forecast would be made for what the price would be if the demand had been a given percentage higher and lower than the actual forecast. ~~The percentage would be based on historical differences between the Pre-dispatch and Real-time demand.~~ The result is a forecast bandwidth around the pre-dispatch price that shows the sensitivity of the price to demand changes. Market participants could use this bandwidth to predict when price volatility would be high and thus when small changes in demand could have a significant price impact. Currently, the pre-dispatch sequence of the Dispatch Scheduling & Optimization (DSO) algorithm does calculate prices for the forecast demand ± 2%, which represents the expected tolerance of the load forecast error. However, the results are not currently stored in any databases and consequently are not published on the IMO web site. Another option for calculating the bandwidths would be to hold the imports and exports constant at the level calculated by the pre-dispatch run with the expected demand when doing the high and low demand runs. This option would require changes to the DSO software.

It was also suggested by the Market Pricing Working Group (MPWG) that resolving the hour-ahead pre-dispatch prices on a 5-minute basis rather than on an hourly basis may result in greater convergence of pre-dispatch and real-time prices. In addition, the 5-minute resolution of pre-dispatch may provide further insight to this price sensitivity issue. (Further discussion on the convergence of pre-dispatch and real-time prices can be found in Issue 30: Forecast of Real-Time Price.)

Why a Pricing Issue

Currently, the IMO publishes no information on pre-dispatch price sensitivity. But given the role that pre-dispatch prices play in the scheduling and price determination of intertie transactions as well as in the TDRP and HADL programs, the potential benefits of a pre-dispatch price sensitivity measure are evident. Providing participants with a means to gage pre-dispatch price volatility should improve the extent and effectiveness of their participation in the IMO-administrered market.

~~The difference between the Pre-dispatch and Real-time price is an issue that can be partly attributed to price sensitivity in the Ontario Market. The Pre-dispatch price bandwidth represents an indicator of price sensitivity, and hence affects the Market Participants' understanding and perception of the Pre-dispatch price. Moreover, it may provide further insight into why and how much the Real-time price may vary from the Pre-dispatch price.~~

Impacts of Issue

Market Impact

The ~~inclusion of the~~ potential introduction of pre-dispatch price ~~bandwidths~~ sensitivity indicators would impact the principles of efficiency, reliability and transparency for price-determination within the IMO-administered markets. ~~The bandwidth~~ Sensitivity data would provide more accurate price signals which both suppliers and consumers can react to when making short-term decisions, thus making the market more efficient. In addition, market reliability could be improved by giving stakeholders the information to reduce unanticipated and/or unnecessary changes in production and consumption that stem from a reaction to pre-dispatch prices that may later on prove to be extremely volatile~~inaccurately predict the Real-time price~~. Market participants would have access to more market information that ~~will~~ might enable them to ~~predict the Real-time price~~ assess the published prices more accurately, thereby making the market more transparent.

Participant Impact

[To be developed]

IMO Processes and Procedures Impact

With respect to the pre-dispatch price bandwidths, ~~N~~no changes to Market Rules would~~ill~~ be required. ~~The Pre-dispatch sequence of the Dispatch Scheduling & Optimization (DSO) algorithm has been changed to calculate the prices for the forecast demand ± 2%. However, the results are not currently written to any databases and are not yet published on the IMO web site.~~ Tool changes and more IT work with significant expense would~~ill~~ be required to make the price

bandwidths currently calculated by the DSO~~results~~ available to market participants.

The potential resolution of pre-dispatch prices on a 5-minute basis would require Market Rules changes, tool changes, as well as additional IT work with significant expense. In addition, the scheduling and pricing of intertie transactions would need to be re-examined.

Related Issues

- 009: Use of Peak Demand Load Forecast in Pre-dispatch
- 012: Under-commitment of Available Generation
- 013: Impact of Out of Market Resources on the Market
- 014: Hour(s)-Ahead Price Signal Uncertainty
- 015: Restriction on Changes to Dispatch Data between 4 and 2 hours ahead of Dispatch Hour
- 030: Forecast of Real-Time Price

Options Considered

[To be developed]

Selected References

Market Pricing Issues Report - May 28, 2004
http://www.theimo.com/imoweb/pubs/consult/mktOps/mo_paper_PricingIssues_20030528.pdf
Quick Take: Transistional Demand Response Program – August 5, 2004
http://www.theimo.com/imoweb/pubs/training/QT16_TDRP.pdf
Quick Take: Intertie Offer Guarantee – September 22, 2002
http://www.theimo.com/imoweb/pubs/training/QT1_IOG_2002sep10.pdf

Independent Electricity Market Operator

QUICK TAKES

Transitional Demand Response Program

Issue 16 **August 4, 2004**

Introduction

This issue of ***Quick Takes*** describes the IMO's Transitional Demand Response Program (TDRP)[1]:

- What is the TDRP?
- How does it work?
- How will participants be selected?

Background

Demand response (DR) can be defined as "actions that result in short-term reductions in peak energy demand."[2] Such actions are typically seen in response to price signals. While many electricity consumers in Ontario do respond to price either on their own initiative or as a part of other programs within the IMO-administered markets[3], many others currently do not. Research in other jurisdictions as well as feedback received by the IMO indicates that these consumers typically are not price responsive because of real or perceived barriers to taking action.

In recognition of the need to encourage the development of more demand response in Ontario, in June 2003, the IMO Board of Directors endorsed the development of a Transitional Demand Response Program (TDRP). The objective of this temporary program is to provide economic assistance to consumers to help them overcome specifically identified barriers that are currently preventing them from being naturally responsive to wholesale market price signals. The intention is that the measures taken by consumers under the program will enable them to continue providing DR after the conclusion of the program.

What is an Identified Barrier?

The TDRP is intended to assist participants to overcome barriers that prevent them from naturally adjusting their consumption in response to price. In the application process, the participant must explain what the barrier is that they need to overcome and how participation in the TDRP will assist them to do so. Participation can help to overcome more than one barrier. Although the IMO is open to considering all reasonable identified barriers, the barriers overcome by participation must include at least one of the following:

- DR is not economic or the benefits are too uncertain without participation in the TDRP
- Existing market rules or regulations impede the provision of DR
- The consumer currently lacks the necessary infrastructure to undertake DR activities
- Lack of awareness of potential to provide DR

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[1] The IMO Board has authorized staff to proceed with the TDRP but has asked to be advised of the nature of the applications that are received through the first round of applications prior to any final selection.

[2] See the Ontario Energy Board report "Demand Side Management and Demand Response in the Ontario Electricity Sector"

[3] Other demand response-related programs in the IMO-administered markets include participating as a dispatchable load, participating in the Hour Ahead Dispatchable Load Program, and participating in the Emergency Demand Response Program.

How Does TDRP Work?

During the term of the program, participants can receive revenue based on their measurable demand reduction. The program will work as follows:

- Participants are eligible to receive TDRP payments for two calendar years from the date on which their demand response project becomes operational under the program. Participants selected in the first round of applications (see the next section below) will have six months to become operational. Those selected in the second round will have three months to become operational.
- The program participants will monitor the pre-dispatch forecast prices[4] on the IMO public web site.
- If the three-hour ahead pre-dispatch price meets or exceeds $120, the participant can choose whether or not they intend to reduce their demand during that trading hour.
- Participants who intend to reduce their demand will notify the IMO at least two hours prior to the start of the trading hour. Participants will notify the IMO by completing IMO_FORM_1566 *"Notification of Intent to Participate in the TDRP"* and uploading it to the Market Participant Interface (MPI)[5]. Participants who do not notify the IMO will not be eligible for payment for that hour.
- After the event, the participant will download and complete IMO_FORM_1567 *"Request for Payment for TDRP"* from the IMO public web site. Once completed, the participant will upload the form to the MPI. This must be done after measurement data is final but no later than four business days after the last trading day of the month following the month in which the demand reduction was provided.
- Payment to each participant is calculated by multiplying the three-hour ahead pre-dispatch price in Ontario by the demand reduction achieved by the participant during the trading hour.[6] For example, if the three-hour ahead pre-dispatch Ontario energy price was $200/MWh and the achieved demand reduction was 5 MWh, the participant would receive $1,000. Please note that the maximum three-hour ahead Ontario energy price that will be used in settlement calculations is $500.
- Payment will be made for demand reduction provided up to the lesser of the accepted project size or 5 MW. The demand data provided by the participant will be subject to audit and possible payment clawback as set out in the market rules.
- Payments will appear as a manual line item on the settlement statement for the last trading day of the month following the month in which the demand reduction was provided.

[4] For information on pre-dispatch price timing and calculation, please see the *Introduction to Ontario's Physical Markets* available via the Marketplace Training web pages.
[5] For a simulation of uploading a document to the MPI, please see the System Simulations page of the Marketplace Training web pages.
[6] Basing payment on the three-hour ahead pre-dispatch price is currently under review. Several alternative payment methods have been examined, and those interested can find further information on the IMO web site at: http://www.theimo.com/imoweb/consult/econDRPP.asp.

How Will Particpants be Selected?

The TDRP will be limited to a total of 100 MW. Prospective participants must apply for admittance to the program. Two rounds of applications will be accepted:

- The first round will close one and a half months after the initial release of the Market Manual and request for applications.
- The second round will close four to five months after the initial release of the Market Manual and request for applications.[7]

The exact dates will be posted on the IMO web site.

Applicants must either already be authorized participants in the IMO-administered markets at the time of application, or must become authorized prior to providing demand response under the TDRP.

Applications must meet the following criteria in order to be considered:

- Participation in the program must assist the participant to overcome a barrier
- The proposed DR activities under the program must be incremental to any current price response activities
- The DR provided must be measurable
- Participants must provide assurance that the proposed DR will endure beyond the end of the TDRP
- Projected DR must be not less than 250 kW and not more than 5 MW either in a single facility or in an aggregation of facilities

In order to allow different market sectors to gain experience with DR, the IMO has established provisional participation goals by sector as follows:

- Industrial: 40% of total DR capacity in the program
- Commercial: 30% of total DR capacity in the program
- Residential: 30% of total DR capacity in the program

These goals are ‘soft’ targets and the actual apportionment may differ depending on the applications received.

The IMO will select projects up to 50% of the provisional sectoral goal in the first round of applications. The remainder will be selected in the second round.

If the total DR capacity of all eligible applicants in a given sector and in a given round exceeds the provisional sectoral goal for that sector, the IMO will select projects for inclusion in the program based on their total score on the following evaluation factors:

[7] The IMO reserves the right to modify and refine the program rules between rounds.

Evaluation Factor	*Weighting in Overall Ranking*
Significance of barriers to be overcome	25
Overall fit with IMO TDRP objectives including but not limited to: • Permanence • Preference for load control over backup generation type projects	25
Expected ability to leverage to other customers and segments	20
Degree to which the proposed DR addresses an "underserved" market segment or opportunity	15
Innovative approach	15
Total	***100 points***

If insufficient eligible projects apply from any sector, the unused capacity will be apportioned to the other sectors.

Measurability of DR

An essential criterion for selection is that the proposed DR must be measurable. The quantity of DR supplied during an event in the case where a TDRP participant has an interval meter will be determined by comparing the measured quantities for the participant during the event against a baseline demand figure. The baseline will be calculated by taking the highest ten measurements during the same period of the day on ten of the last eleven business days (excluding any hours during which the three-hour ahead pre-dispatch Ontario energy price was $120 or greater). In cases where the participant does not have an interval meter, the participant will have developed and submitted a measurement and verification plan that will allow for statistical sampling to determine the baseline from which the DR supplied can be calculated.

As weather can have an impact on the demand of certain kinds of loads, at its discretion, the IMO will allow applicants to propose the use of a weather correction adjustment to their baseline calculation methodology in situations where the inclusion of such an adjustment would materially improve the accuracy of the baseline.

Summary

The Transitional Demand Response Program is designed to assist participants to overcome barriers to carrying out demand reduction in response to electricity price signals. Those wishing to participate in the program must complete and submit applications by the dates posted on the IMO web site. Proposed projects will be accepted for participation in the program based on several selection criteria. Participants will be eligible for TDRP payments for two calendar years from when their project becomes operational under the program.

Additional Resources

- *Introduction to Ontario's Physical Markets* available via the Marketplace Training web pages
- System Simulations available via the Marketplace Training web pages
- Market Manual 5.10: *Transitional Demand Response Program, Issue 1*

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